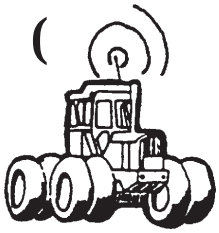
Activity 14



Worm Ranch II

Activity: Students drench vivariums with water, observing and recording the patterns water follows through the soil.

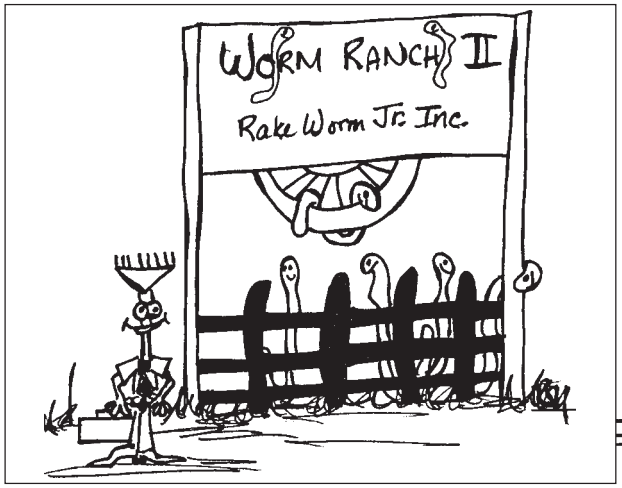
Curriculum Fit: **Grade Eight - Science**
- Topic 6: Interactions and Environments
- Interaction of living things and environments
- Light, soil and temperature needs

Agriculture Concepts: Importance of soil and water

Cognitive Level: Comprehension, Application, Analysis

Materials Required:
- Worm ranches established in the preceding lesson.
- Water.
- Two water bottles with sprinkler attachments.

Time Required: One class period.



NOTE
This is an especially good idea for a science fair project.

Background — For the Teacher

From their work in Worm Ranch I your students have observed some of the behaviour of earthworms and how this behaviour affects soil. In this activity students are to conduct an experiment that will give them information in two areas:

i) Has the presence of earthworms affected the way water percolates through the soil?
ii) How do earthworms respond to a drenching of the soil?

Your students will need information they recorded on Task Sheet One of the activity called Worm Ranch I.

Procedure

Preparation

1. If your students have done the activity Worm Ranch I, then you need only ensure that sprinkler equipment is available.
2. If your students have not done Worm Ranch I, then you need to establish and stock a soil vivarium using the guidelines in Data Sheet One and Teacher Resource Sheet One (from Worm Ranch I). The earthworms will need about a week to establish tunnels before you do this activity.

Introduction

3. Briefly review existing knowledge about earthworms.
4. Ask the students:
   a) What do earthworms do when it rains heavily for a long time?
   b) Why do you suppose they do that?
5. Explain that students are to conduct an experiment that will consider two questions:
   a) Does the presence of earthworms affect the way water runs through soil?
   b) How do earthworms respond to drenching of the soil?

Activity

6. Distribute Task Sheet One and ensure each team knows what information they are to gather.

NOTE
Teams will get the best observations if they divide up tasks so that some pour water, some observe water flow, some observe earthworms and some capture draining water, and some keep time.

7. Have students begin top watering of the vivarium. Students are to record data as changes occur; their notes should include the time elapsed when each event occurs.
   The start of watering should be time 0:00.

Conclusion

8. Have each team tell its results, including a comparison with the initial drainage times and amounts.
9. As a class consider the questions:
   a) Do earthworms affect soil drainage and water holding capacity?
   b) Do earthworms affect sandy soils differently than clay soils?
   c) Do earthworms respond differently to water in sandy soils than in clay soils?

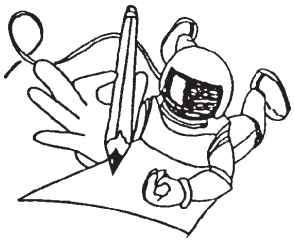
Discussion Questions

1. The ancient Greek philosopher Aristotle called earthworms "the intestines of the earth". Is this a reasonable description based on your colonies?
2. On open, sloping soil, where surface runoff of excess rainwater is possible, how would earthworm activity influence the tendency for soil to erode?
3. Would you expect to find earthworms in soil that was usually cool and waterlogged? What would happen to organic matter falling on this soil?

Related Activities

1. When the vivariums have stopped draining, light them from above with an incandescent source and observe the earthworm response.
2. Obtain 30 cm cubes of lawn, garden and field soil and search them for soil invertebrates. Try to identify any you find and research their ecological niche. In particular, how will they affect the growing of plants for food?
3. Some simple structural and behavioral investigations with earthworms are contained in Chapter 1 of Science Plus 1, Harcourt Brace Javanovich, Canada.

Task Sheet One



Ranch Name _____

Team Members

Number of worms added _____

Number of days since stocking _____

WATER

Volume added _____

Volume draining _____

Volume held in soil _____

Time elapsed before draining begins _____

Time elapsed when draining is complete _____

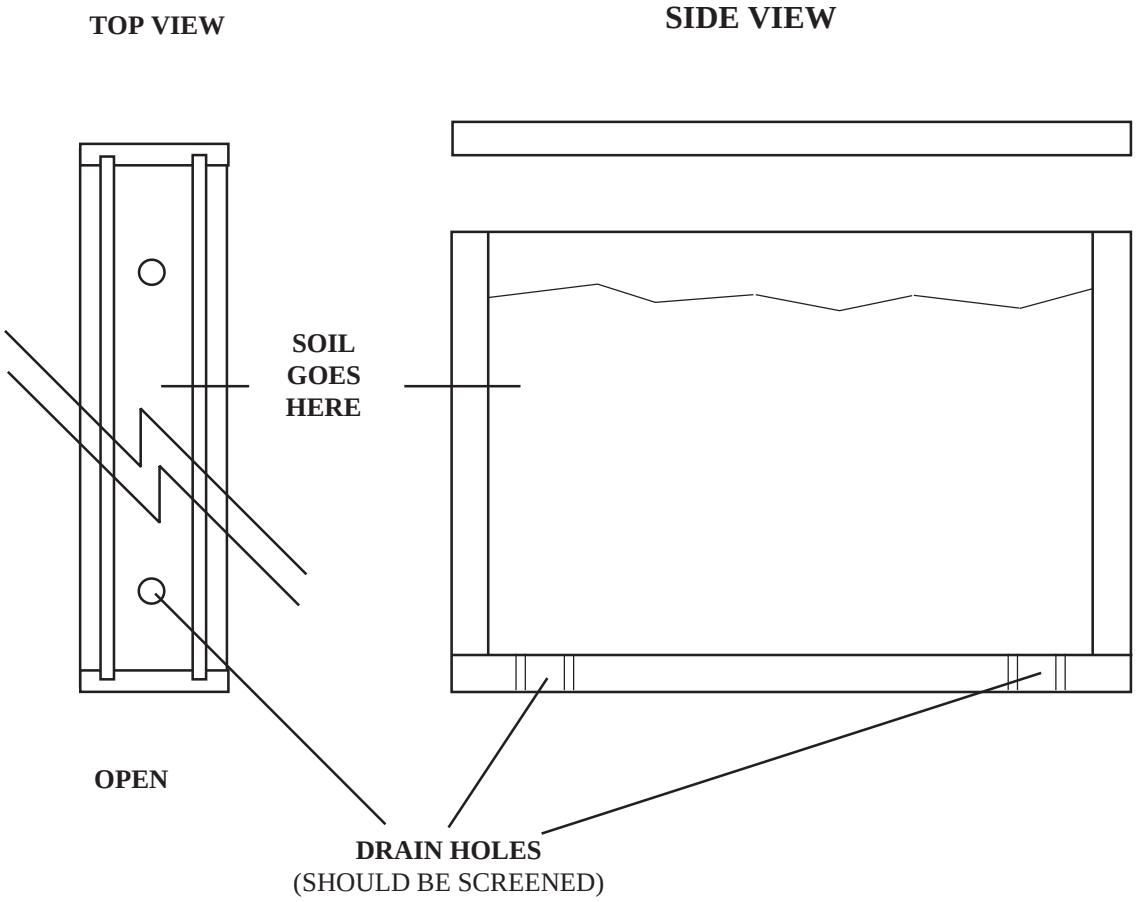
PATH TRAVELLED BY WATER

EARTHWORMS' RESPONSES TO FLOODING

Sheet One --
Building A Worm Ranch

Your worm ranch is a narrow, glass-sided vivarium, commonly known as an ant farm.

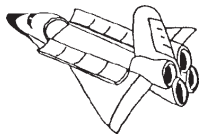
It consists of glass held 3-4 cm apart by a frame, with the space between filled with soil.



It is important to have opaque covers for each side of the worm ranch. Soil organisms are all highly light sensitive and will only tunnel near the glass if it is covered between observations.

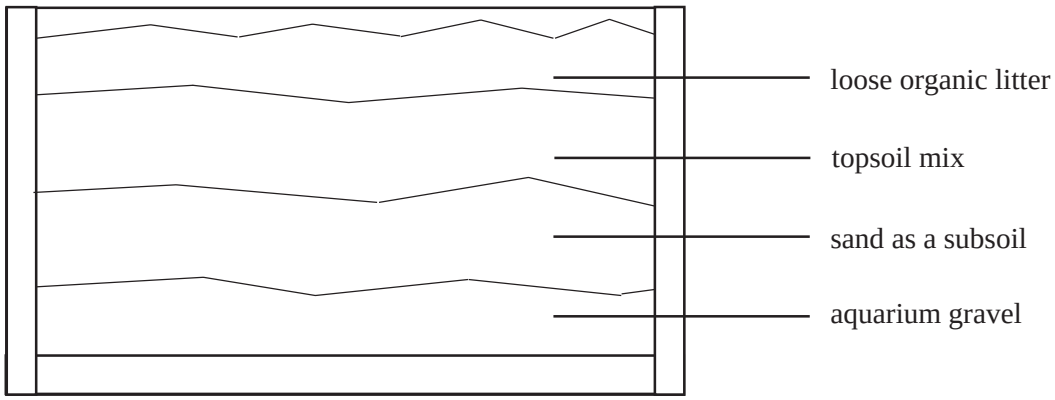
Data Sheet One --

Preparing and Stocking the Worm Ranch

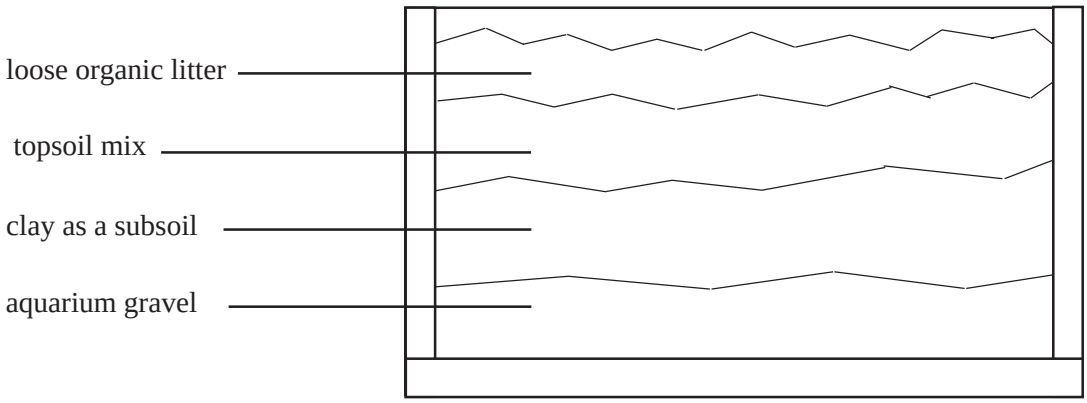


For this activity and Worm Ranch I
you need to fill two soil vivariums with layers of soil as illustrated.

SANDYBASE RANCH **S B**



H W **HOLDWATER RANCH**



The exact depth of each layer is not critical. All layers but the sub-soil should be the same. Each ranch can be stocked with up to 20 earthworms.